

## **REMARKS**

### **Status of the Claims**

Claims 1 – 21, 31 – 33 are pending. Claims 23 – 30 have been previously cancelled. Claims 1 to 3 and 6 are currently amended, claim 5 is now cancelled, and the rest of the claims are as previously presented.

Independent claim 1 has been amended in order to add the feature that a phosphate is added to the slurry to disperse the ferrite particles adsorbed on the magnetite particles and to sequester calcium compounds. Support for this added feature can be found throughout the specification and in former claim 5.

A telephone interview was held between the Examiner, Roy King of the U.S. Patent Office, and Applicants' representatives Charles Lyon and Jeffrey Buchholz on July 21, 2009. Proposed claim amendments were discussed.

### **Claim rejections - 35 USC § 103**

The applicants maintains that a *prima facie* case of obviousness cannot be established against current claim 1 and also submits arguments in support of the non-obviousness of claim 1.

#### ***No prima facie case of obviousness***

The Advisory Action states that “*It would have been obvious to a person of ordinary skill in the art at the time of the invention to add sodium metaphosphate to the hydrometallurgy process taught by Jebrak as a surfactant in order to keep the particles separated, since sodium metaphosphate is known to reduce the magnetic attraction between iron oxide particles, and the Jebrak process taught the use of a deflocculant in order to ease the magnetic separation of particles.*”

This is not correct. A person of ordinary skill in the relevant art of hydrometallurgical processing of electric arc furnace (EAF) dust would not have been motivated to combine JEBRAK et al. with ITOH.

ITOH teaches away from the invention defined in claim 1 for the following reasons:

1. ITOH teaches that dried-on sodium metaphosphate resulted in an anomalous increase in coercivity iron oxide powder. “Coercivity” is a measurement of the resistance of ferromagnetic material to becoming demagnetized, or other words, its tendency to remain magnetized. Materials with elevated coercivities are called hard ferromagnetic materials and are often used for making permanent magnets. Therefore, an increase in coercivity does not teach a decrease in magnetic attraction that would result in separation between the particles. ITOH thus teaches away from separating iron oxide particles.
2. ITOH also teaches that sodium metaphosphate is dried onto iron oxide powder to give an anomalous increase in coercivity. A dry coating does not teach a dispersant, deflocculant or surfactant for an aqueous slurry in the context of hydrometallurgical processing. ITOH’s dry phosphate coating is severely at odds with the field of the present invention of a hydrometallurgical process. Indeed, the behavior of a compound as a dry coating does not teach a person of ordinary skill that the same compound will be useful in an aqueous slurry. Furthermore, if the EAF dust were treated as taught by ITOH without washing or slurring, the process would not work. Pollutants would remain in the dust, the ferrites would not be separable from the magnetites and, moreover, the phosphate would not function to disperse ferrites and sequester calcium in the water-based slurry.
3. ITOH also teaches that the dry-coated powder was washed to remove the sodium metaphosphate which returned the powder to the coercivity value or to less than the value of the untreated iron oxide. Thus, ITOH teaches that upon introduction of water, the powder in fact increases in magnetization since the sodium metaphosphate is removed from the surface. ITOH thus teaches that the dry-coated state of the sodium metaphosphate is essential to increasing coercivity. Such a teaching is in stark contrast to the invention defined in claim 1, which requires the combination of a phosphate and the water-based slurry.
4. ITOH teaches that a dry powder of iron oxide can be dry-coated to increase its coercivity. The behavior of a dry-coated iron oxide powder does not teach a person of ordinary skill in the art that a complex hydrometallurgical aqueous slurry of EAF dust including some iron oxides of different structures, will have similar magnetic,

electrochemical or dispersive behavior. In fact, ITOH does not teach any kind of separation, but merely a decrease in magnetization of the dry powder. It would not be possible to separate ITOH's dry-coated powder into distinct fractions, which is required for the invention defined in claim 1. Thus, a person of ordinary skill in the art would not be motivated by ITOH to use sodium metaphosphate in a hydrometallurgical slurry.

Thus, there is no motivation to combine ITOH's teachings of a dry coating of sodium metaphosphate on iron oxide powder with JEBRAK's teachings regarding a hydrometallurgical process. Consequently, claim 1 and all of its dependent claims are non-obvious and thus patentable over the cited references.

Furthermore, the applicants note that claim 1 specifies that the addition of the phosphate occurs after washing the soluble salts from the EAF dust in step a) of claim 1. This element of the claim is not taught by the prior art. It was found that this previous washing step to remove the soluble salts was necessary to allow the phosphate to have its desired function. Claim 1 clearly claims that step d) occurs after step a). Surprisingly, the Advisory Action refers to *In re Van Geuns*, 988 F.2d 1181 (Fed. Cir. 1993) to allege that this limitation of the order in which the surfactant is added is not present in the claim. The applicants respectfully submit that the broadest reasonable interpretation of claim 1 requires the limitation that step d) occur after step a). Step a) produces a solution; steps b) and c) treat the solution to obtain a slurry; and step d) treats the slurry. The applicants fail to see an interpretation of claim 1 in which a phosphate is not added after the washing step. This claim limitation is indeed present in claim 1 and is not found in the cited references. Claim 1 is thus new and non-obvious over the cited references.

#### **Further arguments in support of non-obviousness**

Notwithstanding the above, the applicant notes that the addition of a phosphate into the slurry both disperses the ferrites relative to the magnetite particles and enables advantageous calcium sequestering for a quicker and sharper fractionation of the slurry to produce the pigments.

Calcium compounds in the slurry presented a technical problem for obtaining the

desired pigments and the phosphate enables a non-obvious solution by sequestering calcium compounds while dispersing the ferrite particles from the magnetite particles.

Thus, the phosphate enables advantageous functionality in the hydrometallurgical process that is not taught or suggested in the prior art.

Of the multitude of dispersants and deflocculants that existed at the time of the invention, it would not have been obvious to a person of ordinary skill to choose a phosphate and to introduce it as claimed. The phosphate's unexpected advantages of both dispersing the ferrites and sequestering calcium compounds found in EAF dust further support the non-obviousness of claim 1.

In light of the above, current claim 1 and all of its dependent claims are non-obvious and thus patentable over the cited references.

**Additional remarks relating to the Advisory Action:**

The Advisory Action alleged that by not raising a certain issue, the applicant impliedly admits that the prior art provides a certain teaching or suggestion. The applicants disagree. The remark that JEBRAK et al. do not teach the entry point of step d) relative to other steps is not an admission that JEBRAK et al. teach all of steps a) - c) and e) as claimed. As explained above, the applicant has noted that the entry point of step d) relative to other steps is advantageous and non-obvious and renders claim 1 patentable over the prior art. On a more general note, the applicant's admissions during the prosecution should be limited to those explicitly made.

**Conclusion**

The applicants believe that the application is in condition for allowance and respectfully request withdrawal of the rejections along with an indication of allowance. Applicants would like to thank the Examiner for his/her time and consideration of this case. If a telephone conversation would help clarify any issues, or help expedite prosecution of, this case, Applicants invite the Examiner to contact the undersigned at (617) 248-5222. Additionally, please charge any fees that may be required or credit any overpayment to our Deposit Account 03-1721.

Respectfully Submitted,  
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